It is easy for one writing now to see the organic connection between Riemann's thought and the step made by Einstein in passing from the special principle of relativity propounded in 1905 to the general theory now established. The recognition of the relative nature of time measurement had already been made in the special principle, and Minkowski quickly perceived that our separate concepts of space and time were thereby brought into a unity. It seems now but a short step to apply Riemann's analysis to this four-dimensional view of the universe.

But questions still linger; the romance of relativity, its sweeping comprehensiveness, leave us breathless. When Dr. Freundlich tells us that "space is banished out of physical laws altogether: just as æther was eliminated out of the laws of electrodynamics by the special theory of relativity," we must pause and ask ourselves if enthusiasm is not going too far. Dr. Freundlich himself finds the mainspring of Einstein's method in two fundamental postulates: (i) that of continuity; (ii) that of causal relationship between only such things as lie within the realm of observation. It was the craving for *continuity* that gave rise to Faraday's conception of tubes of force, developing gradually into the electromagnetic æther. It is the instinctive faith in the second postulate that leads the timid to distrust the formidable array of differential equations between an army of variables that represent the gravitational field in Einstein's theory.

No physical theory has the power to forbid the mind to use the firm scaffolding of Euclidean truth on which to build its own representation of the universe. True, it may be that the representation is not so simple as we had thought; that the Euclidean element of length does not correspond exactly to a measured interval in a rigid body. But the work of the exponents of relativity is not finished until an added clearness is given by them to the picture of how natural phenomena are related. The æther must not be put on the scrap-heap, but must be rehabilitated. Space must not be spoken of as warped, for that is to leave far behind the essential nature of space as a mode of apprehension. The only true continuum is that which the mind conceives. Matter cannot be a singularity in mental space; it can only be a singularity in the picture drawn upon that background. Matter is one and minds are many. So many minds, so many pictures of matter. The correspondences between the pictures are the grounds of our intellectual intercourse, the only evidence of the external world which we possess.

To turn over the pages of this pamphlet is to encounter many questions; nevertheless the reader will have nothing but thanks to offer to the author, and especially to Mr. Brose, who, while yet a prisoner in an enemy country, found solace in truth that transcends racial strife, and translated it for our enjoyment. E. CUNNINGHAM.

Colloidal Therapy.

The Use of Colloids in Health and Disease. By Alfred B. Searle. With foreword by Sir Malcolm Morris. (The Chadwick Library.) Pp. vii+120. (London: Constable and Co., Ltd., 1920.) Price 8*s.* net.

BASED on a lecture delivered at the request of the Chadwick Trustees, this volume provides in compact form an account of the principal facts which are known at the present time regarding matter in its colloidal form, with special reference to the utilisation of colloids in the normal animal organism and in the treatment of disease.

We find a lucid account of the physical properties of colloidal matter and of its reactions in the presence of ionising currents, of electrolytes, of radiations, etc. There is explained in simple scientific language the colloidal nature of cellular protoplasm and the selective permeability of cell membranes for salts and colloids.

The importance of the relatively high content of the protective colloid, lactalbumin, in human milk in relation to its digestibility is emphasised, and the means are stated by which cow's milk may be rendered more suitable for human consumption. In discussing the colloidal nature of the blood, reference is made to the adsorption theory of the conveyance of blood gases and to the phenomena of hæmolysis; an isotonic saline solution is, however, 0·9 per cent. sodium chloride.

The modern processes for precipitating colloidal matter in sewage and drinking water, and the use of soap as a detergent, are also briefly reviewed. The author suggests that the hygienic effect of sea-air is due to the presence in it of particles positively charged by the beating of the waves on the shore, which particles precipitate negatively charged bacterial and other colloids; and in regard to the invasion of the body by micro-organisms, he considers that disturbance of the normal colloidal condition of the body-cells or fluids by undesirable electrolytes, salts, or colloids of the "opposite" sign is an ætiological factor.

The author has devoted considerable space to accounts of the preparation of colloidal sols and of their use in therapeutics. In the latter respect he has digested the bulk of the recent and rele-

© 1920 Nature Publishing Group

vant medical literature on the colloidal remedies now in the market. The relative value of colloidal drugs in treatment is still *sub judice,* and we can only hope that the author's optimism regarding their effects as therapeutic agents may be justified in the future. In this section we note several misprints, such as "epiditymitis," "granulama pupendi," and "leishmonnoris," to mention only a few, and the assertion that the colloidal state is the ideal one for the administration of alkaloids is contrary to the evidence afforded of the inefficacy of colloidal quinine and cocaine. In the course of the work the author makes many speculations on the *rôle* of colloids in physiology and on their possibilities in treatment, speculations which form food for reflection if one is unable to assimilate them all as truths.

The volume, to which Sir Malcolm Morris, whose pioneer work with colloids in skin diseases is well known, contributes an interesting and hopeful foreword, forms a helpful introduction to the subject of colloids in their relation to physiology, pharmacology, and therapeutics, and may be found useful by medical practitioners and others who desire to have a general and not too scientific account of the subject.

Nature Pictures.

Twenty-four Nature Pictures. By E. J. Detmold. (London: J. M. Dent and Sons, Ltd., n.d.) Price 5 guineas net.

SEVERAL important works have recently been published portraying and describing the birds and mammals of the British Islands. Some of these publications are expensive, others appeal to a slender purse; but, whether the lover of such books is able or willing to spend much or only a little on animal pictures, he is fortunate in having a good deal of scope for choice, many of the works that we have seen of late being excellent in every way, combining artistic merit with scientific accuracy.

In introducing a new work on the higher animals to the British public, therefore, it behoves its author to show that it possesses some outstanding feature of merit which may serve as its *raison d'être.* The work under consideration cannot be regarded as serving any zoological purpose, since the subjects are so few in number. Hence any merit it may lay claim to must be sought from its purely artistic side. But such pictures, to be satisfactory, should be accurate in form and colour, so that, while appealing to the artistic sense, they do not at the same time offend the scientific eye; and herein the nature-studies of Mr. Detmold are decidedly faulty.

In a series of twenty-four plates the artist portrays altogether five species of mammals, twenty birds, a fish, a crab, and a lobster. Zoologically speaking, the two crustaceans are, in our opinion, the most successful portraits in the series. The majority of mammal and bird studies are distinctly disappointing, and lead one to fear that they have been drawn from specimens supplied by some unskilful taxidermist. They seem to lack the subtle and delicate curves of beauty we are accustomed to associate with the living and healthy animal, while in some cases the colouring is faulty. The proportions, too, between the parts of the body are sometimes incorrect, even allowing for the effects of foreshortening. In the painting of plumage and pelage there are a peculiar "lumpiness" of surface and angularity of outline which are foreign to our ideas of animal form and beauty. Whether the artist has allowed himself to be carried away by the licence proverbial to his profession, or is endeavouring to formulate a new style of composition and portraiture, we cannot say, but the effect, at least from a zoological point of view, is disappointing and at times irritating.

The surroundings of the various subjects are certainly artistic and original, but in some plates the environment is overloaded with detail, while in others its artificiality is oppressive, and suggests tapestry or wall-paper rather than a background for a "nature-picture." W. E. C.

Our Bookshelf.

General Science: First Course. By L. Elhuff. Pp. vii+435. (London: G. G. Harrap and Co., Ltd.) Price 5*s.* net.

THAT a pupil's first view of science should be a broad one has been more generally recognised in the United States than in this country. The routine of measurements and weighings, which is all that so many of our children know as science, fails to arouse enthusiasm except as a relief from work which is still more dull. Teachers who are breaking away from this system have been helped by more than one recent American publication. Their attention is confidently directed to the volume now under review.

In its general outlines the book does not differ widely from some of the best of its kind, but it is exceptional in that stress is laid in the earliest chapters on the value and the means of maintaining health. To the question "Why study science?" the answer is given: "To learn how to live." That is kept constantly in view throughout the book. In his preface the author puts the following first among the results which he hopes may be achieved: "A desire to grow strong

© 1920 Nature Publishing Group